

17 November 2014

Friends of the Little Red House
225 Sherman Street
Canton, MA 02021

Attention: George T. Comeau, President

Reference: Tilden House Structural Survey, Canton, MA

Dear George:

On 16 October 2014 we observed the interior and exterior structural conditions of the David Tilden House in Canton. The following is a summary of our findings and our recommendations.

General Description

The Tilden House is combination wooden timber and stick-framed house that had its origins dating from about 1725, with its front entrance for the purposes of this report facing the south.

According to a 1975 SPNEA study by FC Detwiller, the house started as a 1 ½-bay, two story structure with a chimney on its west side. This was later expanded with a single story lean-to structure on the west side of the chimney, and again with the addition of part of a pre-existing, possibly earlier structure that was added as a lean-to on the north side. The north lean-to was expanded toward the west, and then much later a second floor was added over the single story west bay of the main structure in the late 19th or early 20th century, possibly at the same time as the gable roofed, single story el on the structure's extreme west end.

The 18th and early 19th century portions of the structure are traditionally timber framed, and the later 19th and the 20th century portions of the structure are stick framed. Foundations are of a combination of rough-cut stone and rubble.

For the purposes of this report, we will describe the portions of the house structure as follows:

- The two story, front of the house will include the "front section's" "east bay", "center bay" (which contains the chimney) and the "west bay".

- The single store rear “lean-to”, will include the relocated “east bay” and the expanded “west bay”.
- The single story, gabled roof extension on the east side of the “front section” will be called the “east el”.

Noted Conditions and Recommendations

The following conditions were noted during our investigation, for which we have the following *recommendations*:

Exterior

Wall Conditions-

- The perimeter stone foundations are in variable condition, needing repointing in some places and localized rebuilding in others.
 - Most of the exposed foundation under the front section wall *needs to be cut and pointed* and there are scattered portions of wall with loose stones that must be re-set.
 - There is an open hole in the front section’s northwest corner *that needs to be patched*.
- Based upon interior and exterior observations, a large portion of the sill beneath the entire structure seems to be in poor condition. This is also true of the wall girts and plates. *We therefore recommend that all sills and wall plates be exposed from the exterior, inspected, and repaired or replaced as needed.*
- The corner boards are cracked on the east el *and should be replaced*.
- Water is entering the basement through the foundation near the northeast corner of the lean-to, as noted below. *The infiltrating water should be intercepted at the exterior before it seeps through the foundation.*

Interior/ Basement and First Floor Structure (from below)

Foundation-

- The perimeter stone foundation appears to be in mostly sound condition with little or no sign of lateral displacement.

- On the rainy day that I visited the Tilden House, water was seeping into the basement from the northeast corner, and puddling on the concrete floor slab below the east bay of the lean-to. *The source of this leakage should be located and eliminated either by foundation pointing or grouting, or better water management at the surface.*
- The rear foundation of the front section which pre-dated the dug-out basement below the lean-to, was partially undercut by the by the digging out. The portion under the rear wall of the front section's east bay sits on an potentially unstable earthen berm, that was left in place as the new floor was excavated below it. *This section of foundation, possible along with a limited portion of the east perimeter wall and chimney base, should be either underpinned or reconstructed with a new foundation of full depth.* Settlement associated with the undercut may be at least partially responsible for the rearward slope of the front section's east bay.
- The foundation under the front section's west bay has been partially removed and partially rebuild to create a full height opening to access the space under the lean-to from the basement under the front section, which pre-existed.

First Floor Structure/ Front Section-

- Two north-south running timber girts are rotted, along with the floor joist on the north edge of the basement stair opening and an east-west running joist under the rear of the front section's west bay. *These members should be sistered with new wood, bolstered, or replaced.*
- The timber sill under the rear wall of the front section's east bay (which bears on the undermined foundation noted above) is rotted *and should be replaced*, along with the west wall sill and much of the south wall's sill.

First Floor Structure/ Lean-to-

- The sill under the lean-to's rear wall is extensively rotted *and must be replaced.*
- The floor framing under the entire lean-to is in very poor condition.
 - The east-west running, floor joist construction below the lean-to's west bay is very lightly framed and mostly rotted, and supported on two added posted bolster beams.

- The north-south running floor joist construction below the lean-to's east bay is also lightly framed, and is supplementarily supported by an added post beneath each joist center.
- The middle joist of the east bay is rotted.
- A pair of heavy timbers run side-by-side under the double-thickness wall that separates the relocated east section of the lean-to and the added west section. These timbers are extensively rotted, have structurally failed, and run like a "rollercoaster" over the residential style screw jacks that have been timber wall plates been inserted under them to prevent their collapse.

In consideration of the extensive damage that has occurred within the first floor construction under the lean-to, we recommend that the west bay framing and double beams be removed and replaced, along with all existing flooring and sheathing, and that the joist framing under the east bay be sistered and better supported and single rotted joist replaced.

Interior/ First Floor Level

Front Section-

- The floor under the east bay slopes east and west from a relative high point in the center. This relates to the post-supported beam layout visible in the basement.
- In addition to the above noted planar irregularity, the east bay floor has a general, northward downslope. This likely relates to subsidence of the undercut foundation and compression of the rotted sill.
- There is also a low point in the floor and demising wall at the east bay's southeast corner, as well as in the front entry vestibule, which relate to the rotted girt conditions noted in the basement, below. Interestingly, the ceiling and floor near the entry slope in opposing directions.
- The ceiling of the east bay sags along the front wall, with respect to the top of the wall. Upon probing this condition, it was apparent that the wall girt had totally deteriorated, along with the pocketed second floor joist ends, meaning that the south edge of the second floor structure was literally hanging in the air. In addition, the front wall was found to have been re-framed with modern era sawn lumber studs behind gypsum wallboard that is covered in a concealed "colonial"

print wallpaper. *The second floor wall girt should be exposed and replaced and the second floor joists should be re-supported with full length sisters.* There is a bolster support added between the first and second floor within the east bay's southeast corner, the installation of which may have been at least partially prompted by this condition.

- The floor of the west bay is relatively level, however the ceiling sags toward the center, *which should be investigated.*
- The west bay's west wall bows out along its base, presumably due to the failure of the sill underneath it. At least a portion of the east bay's south (front) wall hangs in the air, which can be viewed via a rotted hole below it where the sill is completely gone, and also leans outward along its base. *The damaged sills should be replaced.*
- A single, nailed wooden block suspends the back corner of the front stairway. The nails are pulling out and the stairway is sagging. *A more solidly attached support should be installed.*

Lean-to/ West Bay-

- The floor of the lean-to's west bay is highly irregular and bounces underfoot, due to its extremely poor structural condition as seen from below. There are also cracks in the corners of the shower tilework that suggest that supporting structure is moving.
- There appears to be an animal nest within a localized detachment and sag in the ceiling over the west bay's hall *that should be abated and repaired.* There is also a localized section of plaster that has collapsed within the ceiling of the bathroom.

Lean-to/ East Bay-

- The rear wall is extensively rotted and in a total state of failure, with the roof being supported by a line of added bolsters, sleepers and posts, which brace it from both sides. *The rear wall must unfortunately be totally re-framed.*
- The north and south ends of the respective attic floor joists are lost all structural value, due to rot and insect damage, a visible at the first floor from below. The north and south girts that they frame into have also deteriorated beyond repair. They also shower insect frass when tapped on with a hammer. *Because of the*

effective loss in their lengths, they joists must all be replaced, along with the north and south girts that they frame into. The timber summer beam, that spans across the center of the bay, appears to be in good condition and can remain. The attic floor decking should also be replaced.

- The floor slopes downward against the west wall, understandably due to the failure of the double girt beneath this wall.

East El-

- There is a eaten animal hole in the west wall of the ell that should be patched.

Interior/ Second Floor Level

Front Section-

- The floors, walls and ceilings of all three bays slope toward the north, presumably due to the compression of the north sill and subsidence of the foundation. In addition, the wall plate that supports the north end of the east bay's summer beam dips at the summer beam's connection and the north wall of the east bay sags toward the middle. *The sill and foundation below should be addressed as previously noted and the first and second floor posts and wall framing should be investigated and repaired as needed.*
- The south wall of the east bay sags toward the center, along with the floor, which follows the same general curvature but to a lesser extent. The plaster wall finish below the center window is buckled. This is all due to the failure of the second floor wall girt and the north ends of the floor joists as noted previously.
- The center of the west bay's south wall also dips toward the center. This is probably due to the deterioration of the first floor sill.

Lean-to (rear attic)-

- The attic floor bounces underfoot and I put my foot through the floor decking, which is riddled with beetle holes, while walking on it. *The attic floor should framing and floor decking should be replaced as previously noted.*
- In addition to the floor damage, there is evidence of scattered beetle damage on the roof framing, wall framing and sheathing. *The extent of structural weakening should be assessed and the damaged members insect treated and reinforced.*

- The top end of the main hip rafter that defines the roof of the west bay is not directly attached to the presumed-to-be-supporting front section wall and the top of the hip has dropped by several inches (as is visible on the exterior). *A direct connection should be installed and the wall checked and stiffened for the effects of the roof load.*

Interior/ Attic Level (front section)

- The roof framing that is exposed in the attic appears lightly constructed and generally sags. Fortunately little insect or fungal damage is evident. Several of the older rafters, which are in the east bay, have been sistered with newer wood, however the many of the sisters are discontinuous. *The roof structure should borate treated and reinforced by additional sistering and the installatin of collar ties.*
- The floor is covered with a white fibrous insulation that covers all of the floor's structural framing, therefore it could not be assessed. The nature of the white fibrous insulation was not determined.

Thank you for the opportunity to perform this assessment. Please contact us if you have any questions or if we can be of further assistance.

Respectfully Yours,
Structures North Consulting Engineers, Inc.



John M. Wathne, PE, President